

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method for creating a snapshot of a virtual volume containing stored data, comprising:

identifying a virtual volume comprising a plurality of objects defining a mapping to data in at least one storage device, wherein the plurality of objects defining the mapping comprise a set of partitioning objects and a virtual volume object, wherein each one of the ~~plurality of objects defining the mapping~~ partitioning objects corresponds to a different portion of the data in the at least one storage device virtual volume, wherein the virtual volume object comprises references to the set of partitioning objects and information identifying the type of the virtual volume, and wherein the plurality of objects defining the mapping are distributed across more than one processor in a virtualization layer between at least one host and the at least one storage device;

creating a set of partition snapshots for the set of partitioning ~~plurality of objects defining the mapping~~, with one partition snapshot for each of the ~~plurality of~~ partitioning objects ~~defining the mapping~~, wherein each of the partition snapshots comprises a point-in-time copy of ~~the data in the different portion of the virtual volume~~ data in the least one storage device corresponding to the one of the ~~plurality of~~ partitioning objects ~~defining the mapping~~;

creating a snapshot of the virtual volume object comprising a point in time copy of the virtual volume object; and

generating an overall snapshot of the virtual volume from the set of partition snapshots and the snapshot of the virtual volume object.

2. (Previously Presented) The method of claim 1, further comprising distributing the overall snapshot of the virtual volume across more than one processor in the virtualization layer.

3. (Currently Amended) The method of claim 1, wherein each of the ~~set of~~ partition snapshots is created by the processor to which the corresponding partitioning object is distributed.

4. (Currently Amended) The method of claim 1, wherein each of the partition snapshots further comprises state information related to the state of the different portion of the ~~virtual volume~~ data in the at least one storage device corresponding to the each of the partition snapshots at the time the each of the partition snapshots was created.

5. (Currently Amended) The method of claim 1, further comprising:
creating a change log corresponding to the overall snapshot; and
storing, in the change log, changes to the ~~virtual volume~~ data in the at least one storage device made after the overall snapshot is generated.

6. (Original) The method of claim 5, wherein the change log is a copy on write (COW) change log.

7. (Previously Presented) The method of claim 5, wherein the partition snapshot cannot be changed after it is generated.

8. (Currently Amended) A method for creating a snapshot of a virtual volume containing stored data, comprising:

identifying a virtual volume comprising a plurality of objects defining a mapping to data in at least one storage device, wherein the plurality of objects defining the mapping comprise a set of partitioning objects and a virtual volume object, wherein each one of the plurality of objects defining the mapping partitioning objects corresponds to a different portion of the data in the at least one storage device virtual volume, wherein the virtual volume object comprises references to the set of partitioning objects and information identifying the type of the virtual volume, and wherein the plurality of objects defining the mapping are distributed across more than one processor in a virtualization layer between at least one host and the at least one storage device;

creating a set of partition snapshots for the ~~plurality~~ set of partitioning objects defining the mapping, with one partition snapshot for each of the ~~plurality of partitioning objects defining the mapping~~, wherein each of the partition snapshots comprises a point-in-time copy of ~~the data in the different portion of the data in the at least one storage device virtual volume~~ corresponding to the one of the plurality of partitioning objects defining the mapping; and

creating a snapshot of the virtual volume object comprising a point in time copy of the virtual volume object;

specifying, for each of the partition snapshots, a change log volume corresponding to the different portion of the ~~virtual volume~~ data in the at least one storage device corresponding to the partitioning object for the partition snapshot, for

storing changes to the portion of the ~~virtual volume~~ data in the at least one storage device;

generating an overall snapshot of the virtual volume from the set of partition snapshots and the snapshot of the virtual volume object; and

storing, in each change log volume, changes made to the corresponding portion of the data in the at least one storage device ~~virtual volume~~ after the overall snapshot is generated.

9. (Currently Amended) The method of claim 8, wherein the change log volume is maintained by the processor to which the corresponding partitioning object is distributed.

10. (Currently Amended) The method of claim 8, further comprising:
receiving a request for data stored in the ~~virtual volume~~ at least one storage device;

determining, from the change log volume corresponding to the portion of the ~~virtual volume~~ data in the at least one storage device containing the requested data, whether the requested data has changed since the overall snapshot was generated;

retrieving the requested data from the change log volume corresponding to the different portion of the ~~virtual volume~~ data in the at least one storage device containing the requested data when it is determined that the requested data has changed since the overall snapshot was generated; and

retrieving the requested data from the ~~source volume~~ at least one storage device ~~corresponding to the portion of the virtual volume~~ containing the requested data, when it is determined that the requested data has not changed since the overall snapshot was generated.

11. (Previously Presented) The method of claim 10, further comprising:
retrieving the requested data from the overall snapshot, when it is determined that the requested data has not changed since the overall snapshot was generated.

12. (Previously Presented) The method of claim 8, further comprising
distributing the overall snapshot of the virtual volume across more than one processor in the virtualization layer.

13. (Currently Amended) The method of claim 8, wherein each of the plurality of partition snapshots is created by the processor to which the corresponding partitioning object is distributed.

14. (Currently Amended) The method of claim 8, wherein the ~~at least one~~ each of the partition snapshots further comprises state information related to the state of the different portion of the data in the at least one storage device ~~virtual volume~~ corresponding to the each of the partition snapshots at the time the ~~at least one~~ each of the partition snapshots was created.

15. (Currently Amended) A system for creating a snapshot of a virtual volume comprising:

a plurality of storage devices storing data corresponding to a host;

a means for providing a virtualization layer between the host and the plurality of storage devices, the virtualization layer comprising a plurality of objects defining a mapping to data in the storage devices, wherein the plurality of objects defining the mapping comprises a set of partitioning objects and a virtual volume object, wherein each one of the plurality of objects defining the mapping partitioning objects corresponds to a different portion of the data in the storage devices virtual volume, wherein the virtual volume object comprises references to the set of partitioning objects and information identifying the type of the virtual volume, and wherein the plurality of objects defining the mapping are distributed across more than one processor in the virtualization layer between the host and the plurality of storage devices;

a means for providing a snapshot layer between the host and the virtualization layer, the snapshot layer comprising:

a partition snapshot object for each of the ~~plurality of~~ partitioning objects ~~defining the mapping~~ in the virtualization layer, the partition snapshot object having references to (1) the one of the ~~plurality of~~ partitioning objects ~~defining the mapping~~ in the virtualization layer, (2) a COW point-in-time copy of the data in the different portion of the data in the storage devices virtual volume, and (3) a change log corresponding to the portion of the ~~virtual volume~~ data in the storage devices, and

an overall snapshot object of the virtual volume comprising references to each partition snapshot object corresponding to one of the ~~plurality of partitioning~~ objects ~~defining the mapping comprising the virtual volume~~ and a reference to the virtual volume object, the reference comprising a point in time copy of the virtual volume object; and
a means for generating the overall snapshot object.

16. (Currently Amended) The system of claim 15, wherein each COW point-in-time copy of the different portion of the data in the storage devices contains state information about a state of the corresponding portion of the ~~virtual volume~~ data in the storage devices in the virtualization layer when the snapshot layer is generated.

17. (Currently Amended) The system of claim 15, wherein each change log stores changes made to the corresponding portion of the ~~virtual volume~~ data in the storage devices after the snapshot layer is generated.

18. (Cancelled).

19. (Currently Amended) The system of claim 15, wherein the partition snapshot objects are distributed across the ~~multiple~~ more than one processor ~~processors~~ in the virtualization layer.

20. (Original) The system of claim 15, further comprising:

an interface enabling the host to view a point-in-time representation of the data by accessing the overall snapshot object.

21. (Original) The system of claim 15, further comprising:
an interface enabling the host to specify when the snapshot layer is created.

22. (Original) The system of claim 15, wherein the snapshot layer is created on a periodic basis.

23. (Currently Amended) A system for creating a snapshot of a virtual volume comprising:

a means for identifying a virtual volume comprising a plurality of objects defining a mapping to data in at least one storage device, wherein the plurality of objects defining the mapping comprise a set of partitioning objects and a virtual volume object, wherein each one of the plurality of objects defining the mapping partitioning objects corresponds to a different portion of the data in the at least one storage device virtual-volume, wherein the virtual volume object comprises references to the set of partitioning objects and information identifying the type of the virtual volume, and wherein the plurality of objects defining the mapping are distributed across more than one processor in a virtualization layer between at least one host and the at least one storage device;

a means for creating a set of partition snapshots for the set of partitioning plurality of objects defining the mapping, with one partition snapshot for each of the plurality of partitioning objects defining the mapping, wherein each of the partition

snapshots comprises a point-in-time copy of ~~the data in~~ the different portion of the data in the at least one storage device virtual volume corresponding to the one of the plurality of partitioning objects defining the mapping;

a means for creating a snapshot of the virtual volume object comprising a point in time copy of the virtual volume object; and

a means for generating an overall snapshot of the virtual volume from the set of partition snapshots and the snapshot of the virtual volume object.

24. (Previously Presented) The system of claim 23, wherein the generating means further includes:

a means for distributing the overall snapshot across more than one processor in the virtualization layer.

25. (Cancelled).

26. (Currently Amended) The system of claim 23, further comprising:

a means for creating a change log corresponding to the overall snapshot; and

a means for storing, in the change log, changes to the data in the at least one storage device virtual volume made after the snapshot is generated.

27. (Currently Amended) A computer-readable storage medium containing code for directing a processor to perform a method for creating a copy of stored data, the method comprising:

identifying a virtual volume comprising a plurality of objects defining a mapping to data in at least one storage device, wherein the plurality of objects defining the mapping comprises a set of partitioning objects and a virtual volume object, wherein each one of the plurality of objects defining the mapping partitioning objects corresponds to a different portion of the virtual volume data in at the at least one storage device, and wherein the virtual volume object comprises references to the set of partitioning objects and information identifying the type of the virtual volume, and wherein the plurality of objects defining the mapping are distributed across more than one processor in a virtualization layer between at least one host and the at least one storage device;

creating a set of partition snapshots for the set of partitioning plurality of objects defining the mapping, with one partition snapshot for each of the partitioning objects, wherein each of the partition snapshots comprises a point-in-time copy of the data in the different portion of the virtual volume data in the at least one storage device corresponding to the one of the plurality of partitioning objects defining the mapping;

creating a snapshot of the virtual volume object comprising a point in time copy of the virtual volume object; and

generating an overall snapshot of the virtual volume from the set of partition snapshots and the snapshot of the virtual volume object.

28. (Currently Amended) The computer-readable medium of claim 27, wherein each of the at least one partition snapshots further comprises state information related to the state of the different portion of the virtual volume data in the at least one storage device corresponding to the each of the partition snapshots ~~snapshot~~ at the time the each of the partition snapshots was created.

29. (Previously Presented) The computer-readable medium of claim 27, wherein the method further includes:

distributing the overall snapshot across more than one processor in the virtualization layer.

30. (Currently Amended) The computer-readable medium of claim 27, wherein the method further includes:

creating a change log corresponding to the overall snapshot; and

storing, in the change log, changes to the virtual volume data in the at least one storage device made after the overall snapshot is generated.

31. (Currently Amended) The method of claim 1, wherein the overall snapshot of the virtual volume comprises state information related to the state of the virtual volume data in the at least one storage device at the time the overall snapshot was generated.

32. (Currently Amended) The method of claim 1, further comprising:
creating a change log for each of the partition snapshots for storing changes to
the different portion of the data in the at least one storage device ~~virtual volume~~
corresponding to the partitioning object for the each of the partition snapshots; and
storing, in the change log, changes to the portion of the data in the at least one
storage device ~~virtual volume~~ made after the partition snapshot is generated.